68
OL

THE NEW CONCEPT IN QUALITY AND SERVICE

OLIN MATHIESON CHEMICAL CORPORATION / METALS DIVISION

ALUMINUM FOR ARCHITECTURE

OLIN ALUMINUM: A NEW CONCEPT OF QUALITY AND SERVICE

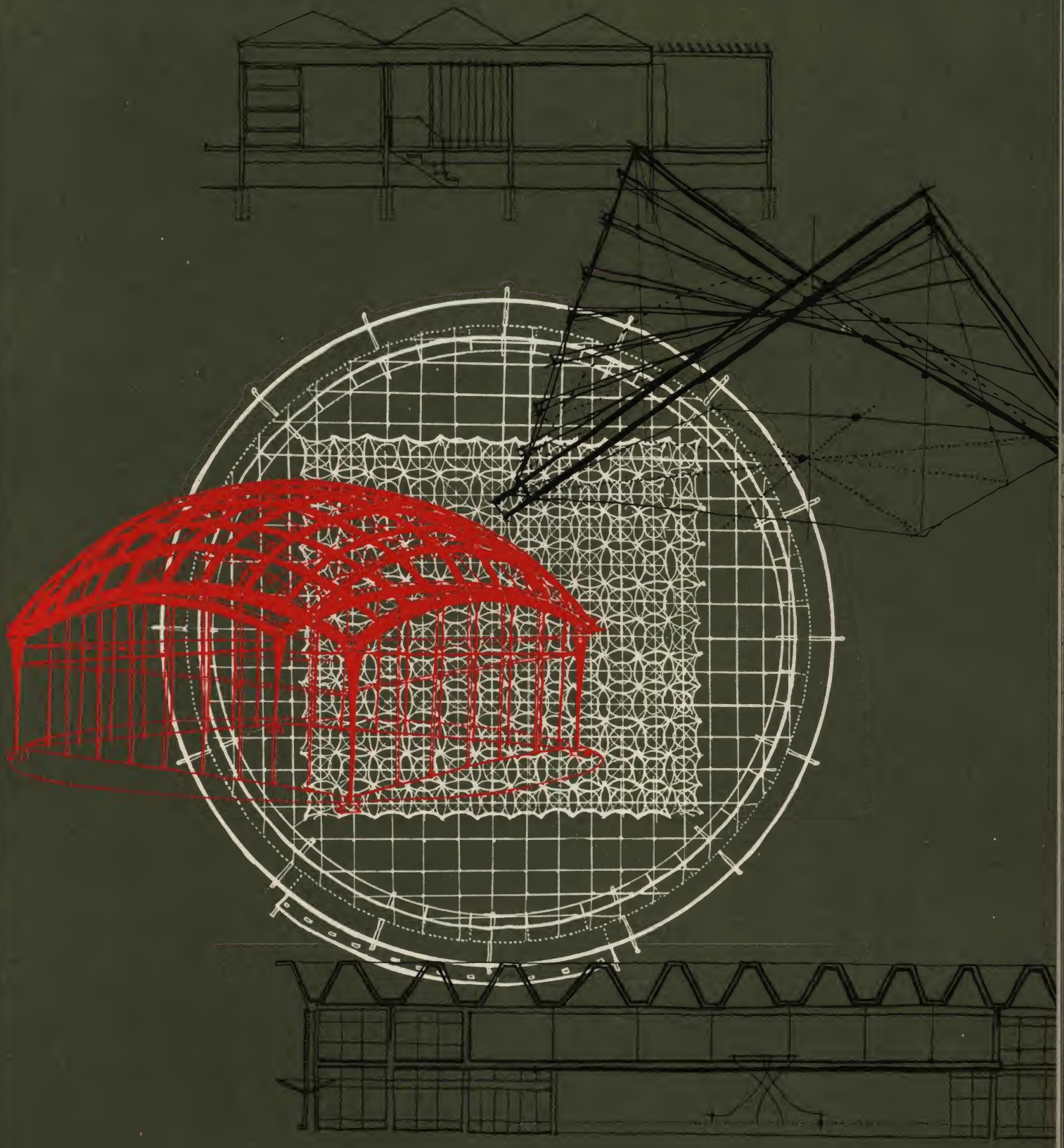
Creativity in the practice of architecture has been synonymous with progress in the building industry. With this identity, largely accomplished by architects who design and supervise the construction of our buildings, must be coupled the complex technology of our expanding industrial skills. The challenge of this market has prompted Olin Mathieson Chemical Corporation to create a new concept of quality and service by Olin Aluminum for the building industry. Guided by seventy years of Olin Mathieson customer satisfaction, ⍟ has already secured an enviable record regarding its basic mill products and customer services. This concept, based upon servicing the needs of the building industry today is utilized to satisfy the creative demands of tomorrow's architecture.

⍟ Service Concept—**General Information: pages 4-5** includes basic data on aluminum properties with explanation of heat treatable and non-heat treatable alloys. **Aluminum Alloy Chart: page 6** lists the variety of alloys available and recommended architectural application. **Typical Properties: page 8** is a compilation of mechanical properties for architectural aluminum alloys in the various scales of temper or hardness.

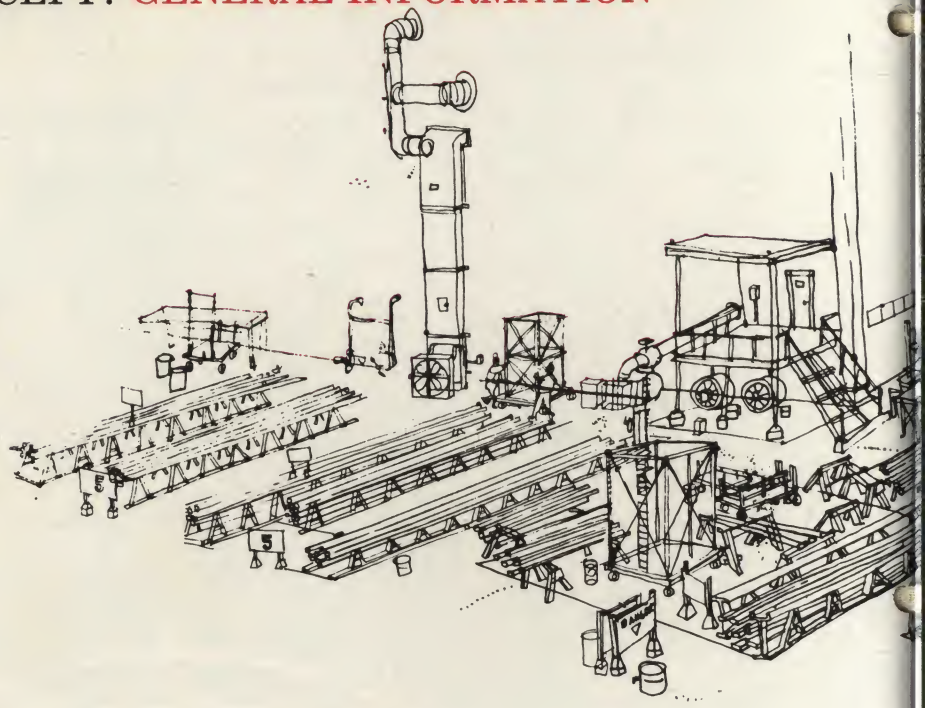
⍟ Quality Concept—**Facilities: page 10** describes the mill structure of Olin Mathieson, its integrated plant operation, and quality control concept. **Mechanical Finishes: page 12** gives a guide to mechanical finishing which has been set up by the National Association of Architectural Metal Manufacturers. **Electrochemical Finishes: page 14** describes the process and gives recommended coatings for the varying architectural exposures. **Applied Finishes: page 16** is a brief description of several applied finishes and sources for further specifications. **Specification Outline: pages 18-19** is a general outline of specifications to be used as a guide when specifying architectural aluminum. **Sales Office Directory: back cover.**

THE ⍟ SERVICE CONCEPT: Depth— Olin Aluminum is organized to give the building industry service to effectively meet its particular requirements. All of these services are integrated through the Olin Aluminum sales offices that are conveniently located throughout the country. Our representatives are qualified by education and experience to give special consideration to building and construction problems and help resolve these problems in relation to the mill products produced by Olin Aluminum and the finished products as produced by the building industry metal fabricators. Additional field representation includes Technical Advisors and Product Specialists to assist in the further translation of new ideas into aluminum. These personalized services, backed up by specially trained Architectural Representatives centrally located and combined with the cooperation and consultation readily available at Metallurgical Research Laboratories in New Haven, Connecticut, offer the construction industries service-in-depth for new aluminum developments.

NEW ARCHITECTURAL FORMS have gained prominence in recent years and stimulated the thinking for structural design. Noteworthy engineering advances have taken shape in space frames and stressed skin structures. Many have been designed in aluminum and hold great promise for this new technology of architecture.



THE ♀ SERVICE CONCEPT: GENERAL INFORMATION



ALUMINUM ALLOYS—High purity aluminum is relatively soft, ductile, and highly resistant to corrosion. By alloying with manganese, magnesium, silicon, copper, zinc, and other metals, it is possible to secure aluminum alloys which have a wide range of properties (see pages 6 & 8) that are particularly suited for architectural application. The temper designations which follow the alloy numbers indicate the type of treatment the metal receives to impart desired mechanical properties.

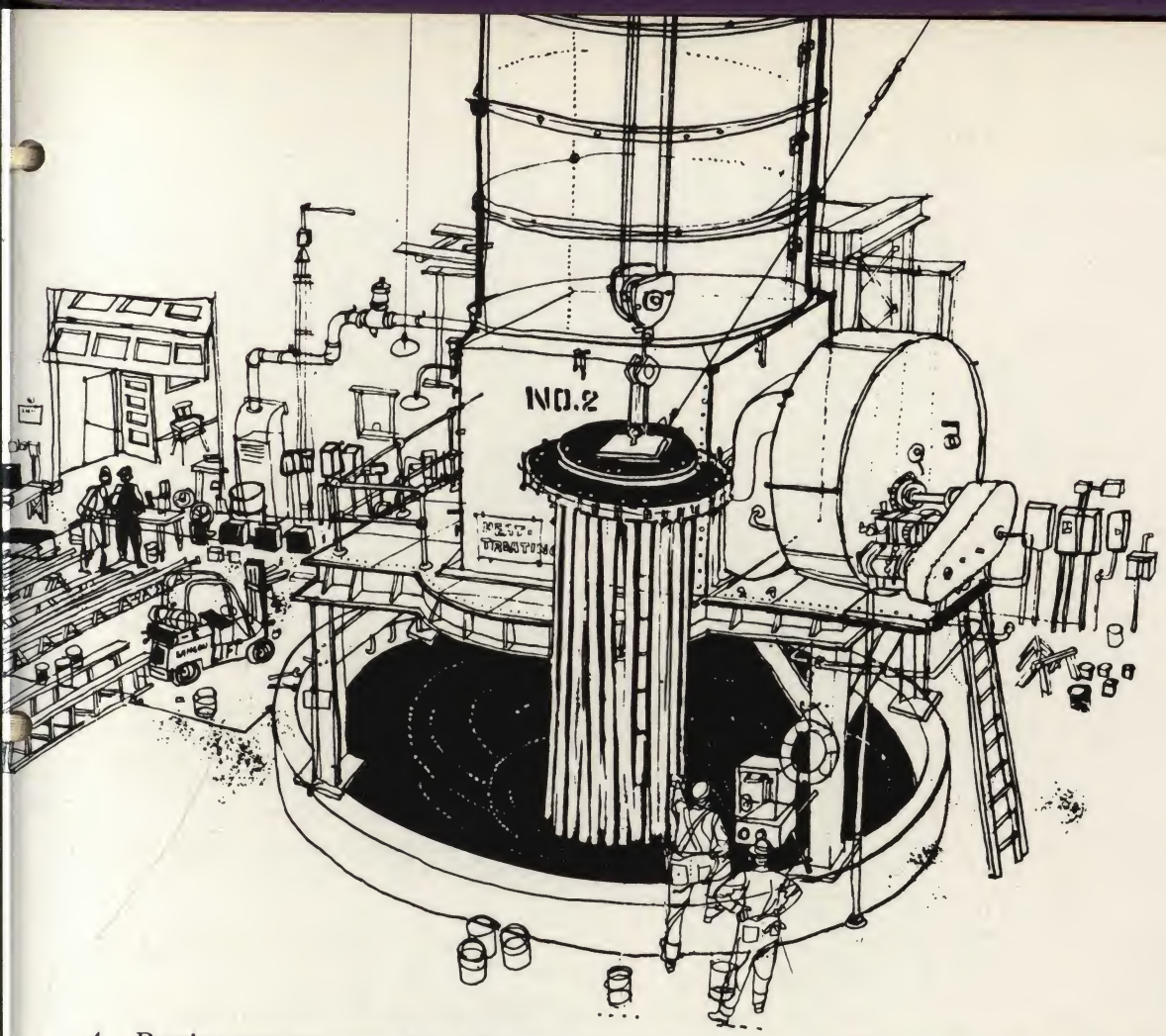
BASIC TYPES—Aluminum products are designated as "Wrought" if their basic form results from mechanical work performed on solid metal. "Cast" products are those formed by pouring metal into a mold.

Aluminum alloys are sub-divided into two groups: (1) non-heat treatable alloys, generally referred to as the "common" alloys and (2) heat treatable alloys. The heat treatable alloys carry the T-temper designation, indicating these alloys have been subjected to controlled heat treatments in order to meet guaranteed mechanical properties. The non-heat treatable alloys carry the H-temper designations, indicating these alloys have been subjected to cold working in order to meet the applicable mechanical properties. Alloy and temper designations along with the guaranteed minimum mechanical properties are standards set by the Aluminum Association and met by all aluminum producers.

ARCHITECTURAL ALLOYS—Since uniformity of color and finish are important for architectural applications, certain alloys have become known as architectural alloys. These fall into two groups (1) those alloys which when anodized, produce the natural bright appearance associated with aluminum, and (2) those alloys which produce, when anodized, tones of gray. (See table, page 6, for those alloys which produce color matches between sheet, extruded, and cast products.) The gray tones, which result from the presence of silicon in the alloy, should not be confused with color as produced by color anodizing. True color anodizing is achieved by the addition of special dyes during the anodizing process.

ENGINEERING PROPERTIES OF ALUMINUM ALLOYS—Data applies to wrought and cast alloys:

1. Young's modulus of elasticity—10,300,000 lbs. per sq. in. (Average, varies with alloy.)
2. Modulus of rigidity (modulus of elasticity in shear)—3,800,000 lbs. per sq. in.
3. Poisson's ratio—0.33.



4. Bearing strength—equal to 1.8 times the tensile strength, when the edge distance in the direction of the applied stress is not less than twice the diameter of the hole.
5. Yield strength—equals the stress at which the material indicates a permanent set of 0.2 per cent.
6. Shear strength—obtained by taking single shear values based on double sheer tests.
7. Fatigue endurance values obtained by subjecting a specimen to 500 million cycles of completely reversed stress using the R. R. Moore type of machine and specimen. (Expressed in 1,000 lbs. per sq. in.)
8. Coefficient of expansion—0.000013 in. per in. per °F. (approx. ⅛″ for every 8′ length in 100° F. change.)

RECOMMENDED PROTECTIVE MEASURES AGAINST ELECTROLYTIC CORROSION — When there is the possibility of the presence of moisture, and particularly in heavy industrial and seacoast atmospheres, aluminum should be protected against electrolytic corrosion. Such corrosion may occur when aluminum is placed in contact with dissimilar metals. Effective insulation may be achieved by the use of approved non-absorptive gaskets or by painting the contact surfaces with (1) zinc chromate primer, (2) aluminum pigmented metal-and-masonry paint, or (3) approved bituminous paint. Allow the paint to dry thoroughly before placing the two surfaces in contact with each other. To minimize discoloration of aluminum surfaces, avoid lead pigmented paints and also placing aluminum materials where they are subject to drainage from copper alloys, iron alloys and masonry. As with other materials, aluminum demands good design and detailing practices.

MAINTENANCE OF ALUMINUM—Although aluminum has a high resistance to corrosion and normally will remain clear in appearance, periodic cleanings to remove atmospheric grime will help to preserve its initial finish. Unless the deposits are of long duration and relatively thick, wash with a mild soap and warm water and then rinse and dry. Should these measures prove ineffective, use a nonetching chemical cleaner applied in accordance with the manufacturer's directions. Where the above methods are still ineffective, clean first with a nonetching solvent cleaner and then use a wax-base polish cleaner applied in accordance with the manufacturer's directions. In extreme cases, use a stainless steel wool pad (00 size or finer) and a wax-base polish cleaner. If a strong alkaline or strong acid cleaner must be used, care should be taken to flush all surfaces and joints thoroughly. For further reference see "Care of Aluminum" published by the Aluminum Association, 420 Lexington Ave., New York 17, N. Y. July 1959.

THE ℞ SERVICE CONCEPT: ALUMINUM ALLOY CHART

APPLICATION	ALLOY	COMMENTS
Anodized sheet Formed sheet Plate for mullion and spandrel covers, curtain wall panels, sun shades and other components	Nos. 2 and 5 architectural sheet	Turns to shades of gray when anodized, no. 5 architectural sheet producing darker tone. Excellent color-fastness and corrosion resistance.
	1100	Low strength sheet for metal work and paneling applications requiring very high degree of forming or drawing for fabrication.
	3003	Economical, general purpose sheet. Excellent formability and good corrosion resistance.
	5005	Popular low cost, all-purpose sheet. Matches 6063 extrusions when anodized. Good corrosion resistance and formability. Anodized appearance clearer and lighter than 3003 or 5052 alloys.
	5050	Stronger than 3003 and 5005 alloys. Excellent workability and corrosion resistance. One of the better finishing alloys; gives comparatively clear white appearance after etching or anodizing.
	5052	Highest strength common alloy in general use. Good workability. Excellent resistance to corrosion, particularly to salt water exposure. Thin anodic coatings give it color close to 6061 and 6063 extrusions. Good weldability but requires careful techniques.
	6061	Most economical and versatile of heat-treatable alloys. Good corrosion resistance. Excellent color match with 5005 sheet and 6061 extrusions. Used for moderately high strength sheet applications or rolled structural shapes. Sheet sometimes clad to obtain superior appearance and/or added corrosion protection.
	Anodizing quality sheet 1100 3003 5005	For special, quality applications, such as building and store fronts, where good overall finish is required. Mechanical properties same as 1100, 3003, 5005 sheet respectively.
Castings* for decorative work and building hardware	43	For ornamental (i.e., cast spandrel covers) and hardware products where high strength is relatively unimportant. Turns gray to match no. 2 architectural sheet when anodized.
	214	Best color match for anodized 6063 extrusions. Stronger than 43 alloy castings.
	356	High strength casting alloy. Anodizes with gray tone to match no. 5 architectural sheet.
Extruded Shapes for copings, fascia, gravel stops, trim, handrails, moldings, thresholds, mullions, components	6063	Offers best extruding properties. Anodic appearance matches anodized 5005 Sheet.
	6061	For high strength requirements. Excellent match with 6061 sheet in anodized condition.
	6062	Used in structural applications. Extrudes easier than 6061 while retaining comparable strength.
Fasteners for rivets, nails, screws, bolts	1100	For plain, or anodized rivets and washers.
	6061	For plain or anodized high strength rivets.
	2024	For plain or anodized bolts, nuts, screws and nails.
Industrial Roofing and Siding	Clad 3004	For roofing and siding sheet requiring high corrosion resistance and strength characteristics. Corrugated, ribbed or V-beam sections and embossed patterns.
Gratings	5052	Used in heavier gauges for expanded gratings and walkways. For light gauge shelving, protective screening and ornamental grillwork.
Porcelain Enamel Work for variety of colors in matte semi-gloss or gloss finish	1100 3003 6001	Sheet and plate
	6061 6062 6063	Extrusions
	43 356	Castings
Sheet Metal for ductwork, gutters, flashing	5005	Best quality, medium strength sheet for all-purpose work. Good corrosion resistance and formability.
	3003	Medium strength sheet. Good corrosion resistance and formability.
Welded Members	3003	Tube and pipe applications.
	5052	Excellent corrosion resistance, especially for salt water exposure. Good weldability but requires careful techniques.
	6061	Most economical and versatile heat-treatable alloy, only one readily fusion welded. Good corrosion resistance. Sheet may be clad for superior appearance and/or added corrosion protection.
	6063	Used for architectural metal work because of uniformity of color. Care should be exercised when welding. Use proper welding rod to minimize discoloring when anodizing.

*When castings are anodized for architectural application, they do not dye or anodize evenly due to metal porosity.

COMMERCIAL applications of Olin aluminum are prominent in curtain walls at the Ford Motor Company Staff and Product Engineering Building in Dearborn, Michigan. New developments in pivoted windows, spandrel materials and wall framing devices have given architects greater design latitude than ever before for monumental buildings.

THE ♀ SERVICE CONCEPT: TYPICAL PROPERTIES

NON-HEAT TREATABLE ALLOYS

Alloy	Temper	Government spec. no.	Wt. lbs./cu. in.	Tensile properties: yield strength psi	Tensile properties: ultimate strength psi	Shear: shearing strength psi
1100	0	QQ-A-561	0.098	5,000	13,000	9,000
	H12			15,000	16,000	10,000
	H14			17,000	18,000	11,000
	H16			20,000	21,000	12,000
	H18			22,000	24,000	13,000
3003	0	QQ-A-359	0.099	6,000	16,000	11,000
	H12			18,000	19,000	12,000
	H14			21,000	22,000	14,000
	H16			25,000	26,000	15,000
	H18			27,000	29,000	16,000
Clad 3004	0	—	0.098	10,000	26,000	16,000
	H32			25,000	31,000	17,000
	H34			29,000	35,000	18,000
	H36			33,000	38,000	20,000
	H38			36,000	41,000	21,000
5005	0	—	0.098	6,000	18,000	11,000
	H12			19,000	20,000	14,000
	H14			22,000	23,000	14,000
	H16			25,000	26,000	15,000
	H18			28,000	29,000	16,000
	H32			17,000	20,000	14,000
	H34			20,000	23,000	14,000
	H36			24,000	26,000	15,000
	H38			27,000	29,000	16,000
5050	0	—	0.097	8,000	21,000	15,000
	H32			21,000	25,000	17,000
	H34			24,000	28,000	18,000
	H36			26,000	30,000	19,000
	H38			29,000	32,000	20,000
5052	0	QQ-A-318	0.096	13,000	28,000	18,000
	H32			28,000	35,000	20,000
	H34			31,000	38,000	21,000
	H36			35,000	40,000	23,000
	H38			37,000	42,000	24,000
5083	0	—	0.096	0.25″-0.75″ 22,000	44,000	
	H113			0.751″-2″ 20,000	41,000	
				0.25″-2″ 33,000	46,000	

HEAT TREATABLE ALLOYS

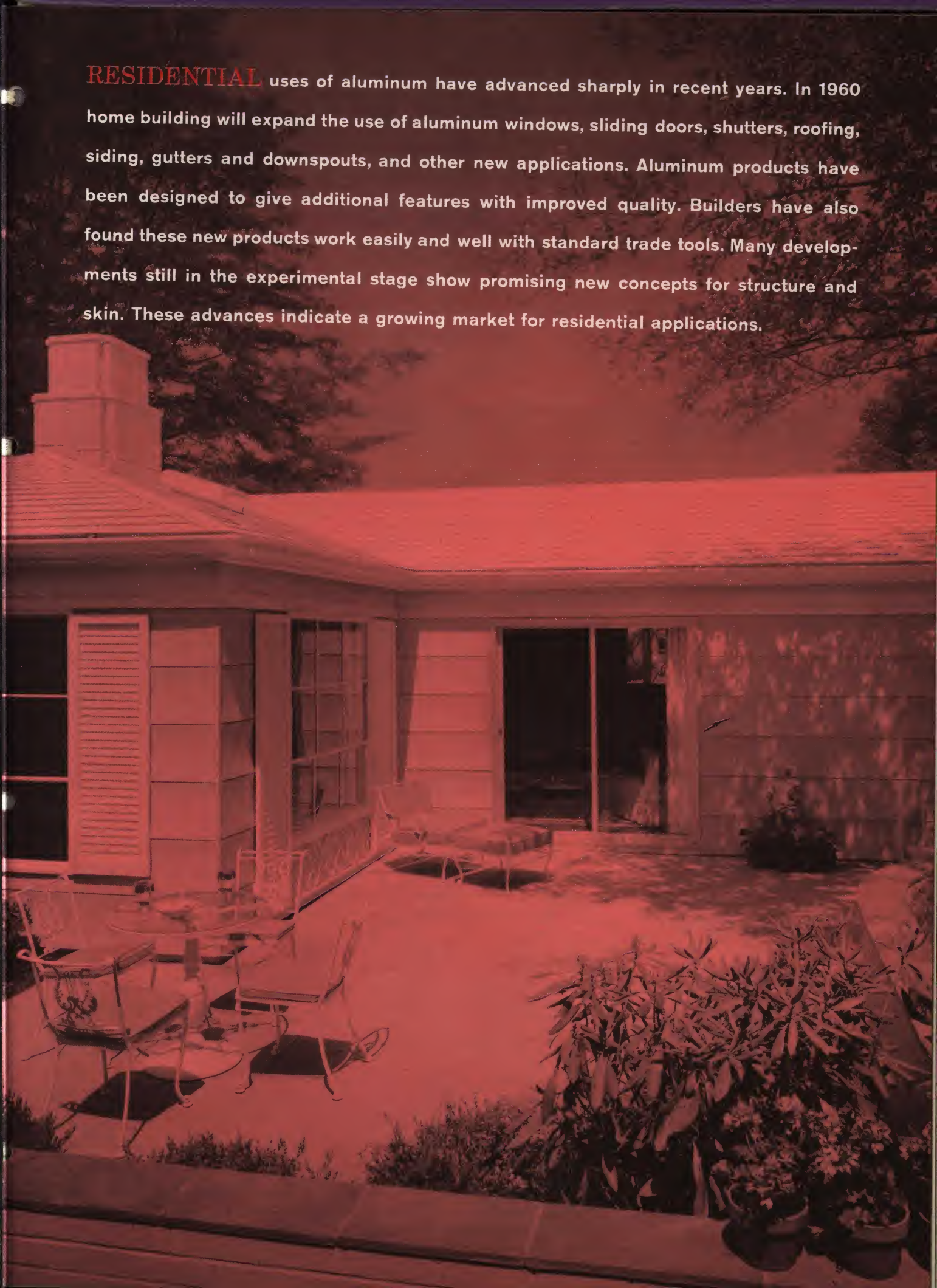
Alloy	Temper	Government spec. no.	Wt. lbs./cu. in.	Tensile properties: yield strength psi	Tensile properties: ultimate strength psi	Shear: shearing strength psi
6061	0	QQ-A-327 (sheet)	0.098	8,000	18,000	12,000
	T4	QQ-A-270 (extrusions)		21,000	35,000	24,000
	T6			40,000	45,000	30,000
6062	0	QQ-A-270 (extrusions)	0.098	8,000	18,000	12,000
	T4			21,000	35,000	24,000
	T6			40,000	45,000	30,000
6063	0	QQ-A-274 (extrusions)	0.098	7,000	13,000	10,000
	T42			13,000	22,000	14,000
	T5			21,000	27,000	17,000
	T6			31,000	35,000	22,000
Clad 2014	0	QQ-A-255	0.101	14,000	27,000	18,000
	T4			42,000	62,000	38,000
	T6			60,000	70,000	42,000
2024	0	QQ-A-268 (rod & bar)	0.100	11,000	27,000	18,000
	T36			57,000	72,000	42,000
	T4			47,000	68,000	41,000

CASTING ALLOYS

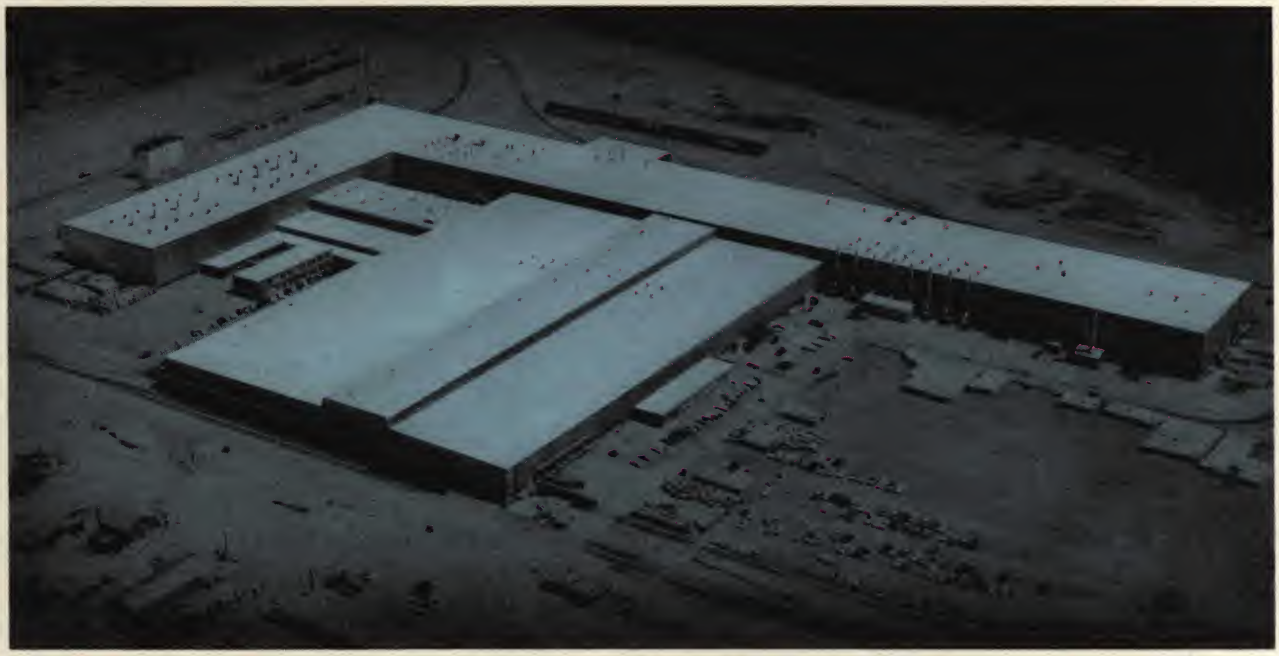
43	—	QQ-A-601 (sand cast)	—	8,000	19,000	14,000
		QQ-A-596 (permanent mold)		9,000	23,000	16,000
		QQ-A-591 (die cast)		16,000	30,000	19,000
214	—	QQ-A-601 (sand cast)	—	12,000	25,000	20,000
		QQ-A-596 (permanent mold)		16,000	27,000	22,000
356	T6	QQ-A-601 (sand cast)	—	24,000	33,000	26,000
		QQ-A-596 (permanent mold)		27,000	40,000	32,000

NOTE: Additional reference material is available from the "Aluminum Construction Manual" published by the Aluminum Association, 420 Lexington Ave., New York 17, N. Y. August 1959.

RESIDENTIAL uses of aluminum have advanced sharply in recent years. In 1960 home building will expand the use of aluminum windows, sliding doors, shutters, roofing, siding, gutters and downspouts, and other new applications. Aluminum products have been designed to give additional features with improved quality. Builders have also found these new products work easily and well with standard trade tools. Many developments still in the experimental stage show promising new concepts for structure and skin. These advances indicate a growing market for residential applications.



THE ☓ QUALITY CONCEPT: FACILITIES



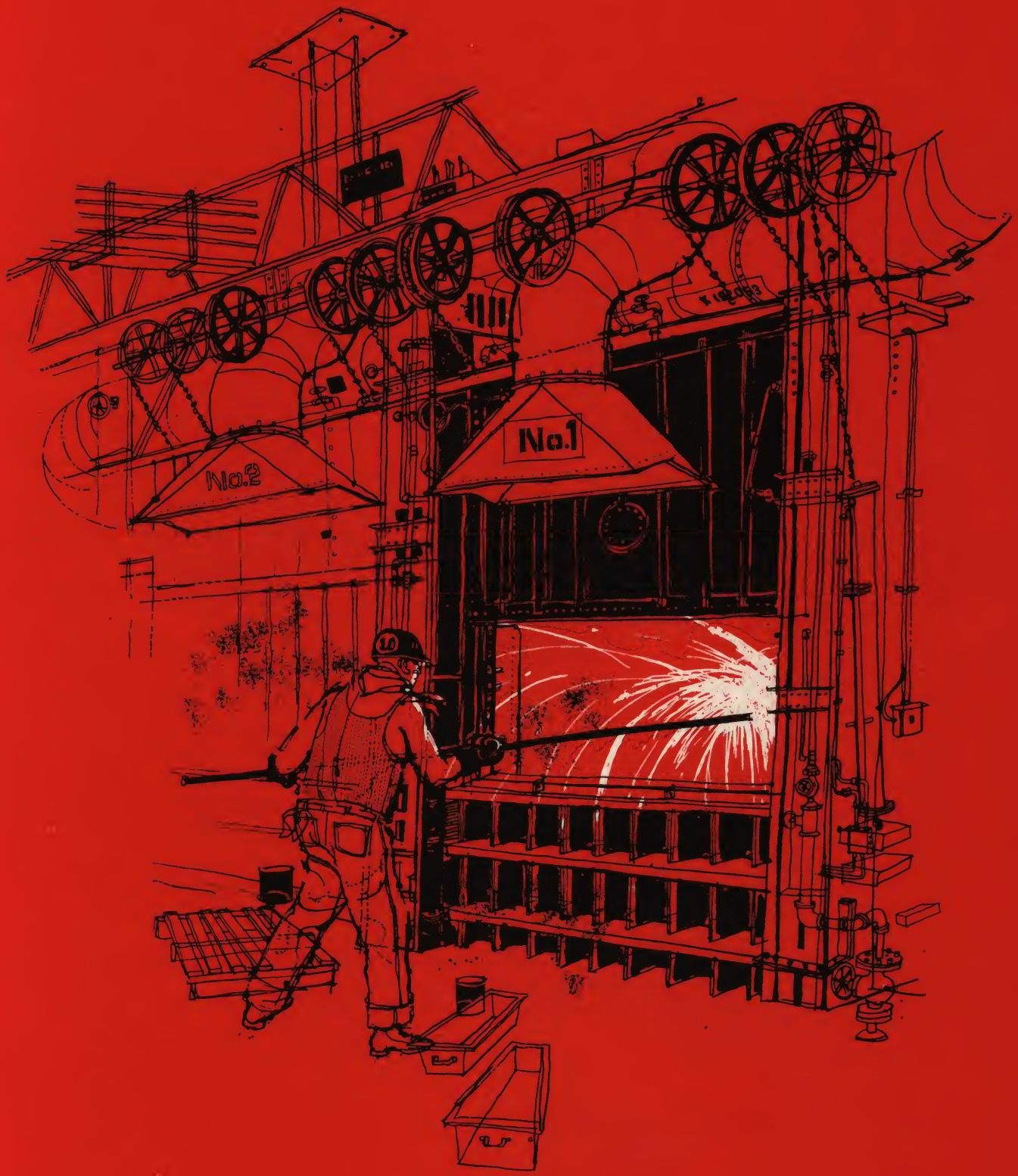
Advanced technology in aluminum and architecture has broadened the construction market to such an extent that unique and special processes for aluminum have been developed. To assure results in these specially processed materials, Olin Aluminum has formulated and put into practice a carefully planned program of quality control at the mill level to fulfill the obligations of building industry demands.

The control of quality inherent throughout the production of Olin Aluminum sets a new standard for the aluminum industry. Moreover, your source of supply is assured by this fact: Every Olin Aluminum customer is the terminal point of a massive, unbroken chain of supply that extends from the bauxite mine to facilities that assure the prompt servicing of your aluminum requirements.

Olin Aluminum is custom-tailored to specifications supplied by its users. In addition to pig, ingot and billet products, Olin Aluminum makes available sheet and light plate (rolled at Omal plant shown in illustration above), extrusions, pipe, tubing, electrical conductor and busway, as well as rod and bar stocks, in a great variety of forms, shapes and alloys. Use of these aluminum products can help simplify customer manufacturing procedures and enable them to achieve maximum efficient production from every pound utilized.

Olin Aluminum does not manufacture a finished architectural product, but supplies its customers with metal for further fabrication. This, combined with the availability of a unique service-in-depth, assures the building and construction industries the end-products they require.

REMELTING FURNACE. **The control of quality begins at the remelting furnace. The mining of ore, refining of bauxite, and the reduction of alumina to metal were basic needs. Now each heat of metal is destined for application. Here the individual blend of alloys for each order takes form. Here each customer's requirement and the concept of quality from furnace to finish has begun.**



THE ♌ QUALITY CONCEPT: MECHANICAL FINISHING

MECHANICAL — Generally, the appearance of various wrought and cast alloys differs slightly in the mill-produced condition. This is because combinations of inherently different alloying elements produce gradations of surface tones and shades. The simplest way to attain a uniform surface is to utilize some mechanical finishing action. Most freshly polished aluminum alloys look very much alike before anodizing. Once so treated, aluminum retains a bright pleasing appearance for a considerable period, depending on atmospheric conditions and maintenance.

Mechanical finishing includes grinding, buffing, and polishing to achieve different textures, brightness, or uniform surface appearance. Sandblasting is used to produce a matte surface, or to economically and quickly give shining aluminum components gray, non-reflective surfaces. Scratch brushing and satin finishing are accomplished with rotating wire brushes ranging from coarse to fine depending upon finish specified. Other methods used to obtain satin finishes include the use of oil lubricated abrasive cloths, stainless steel wool in conjunction with oil and emery powder, or stainless steel wool saturated with a mild soap solution.

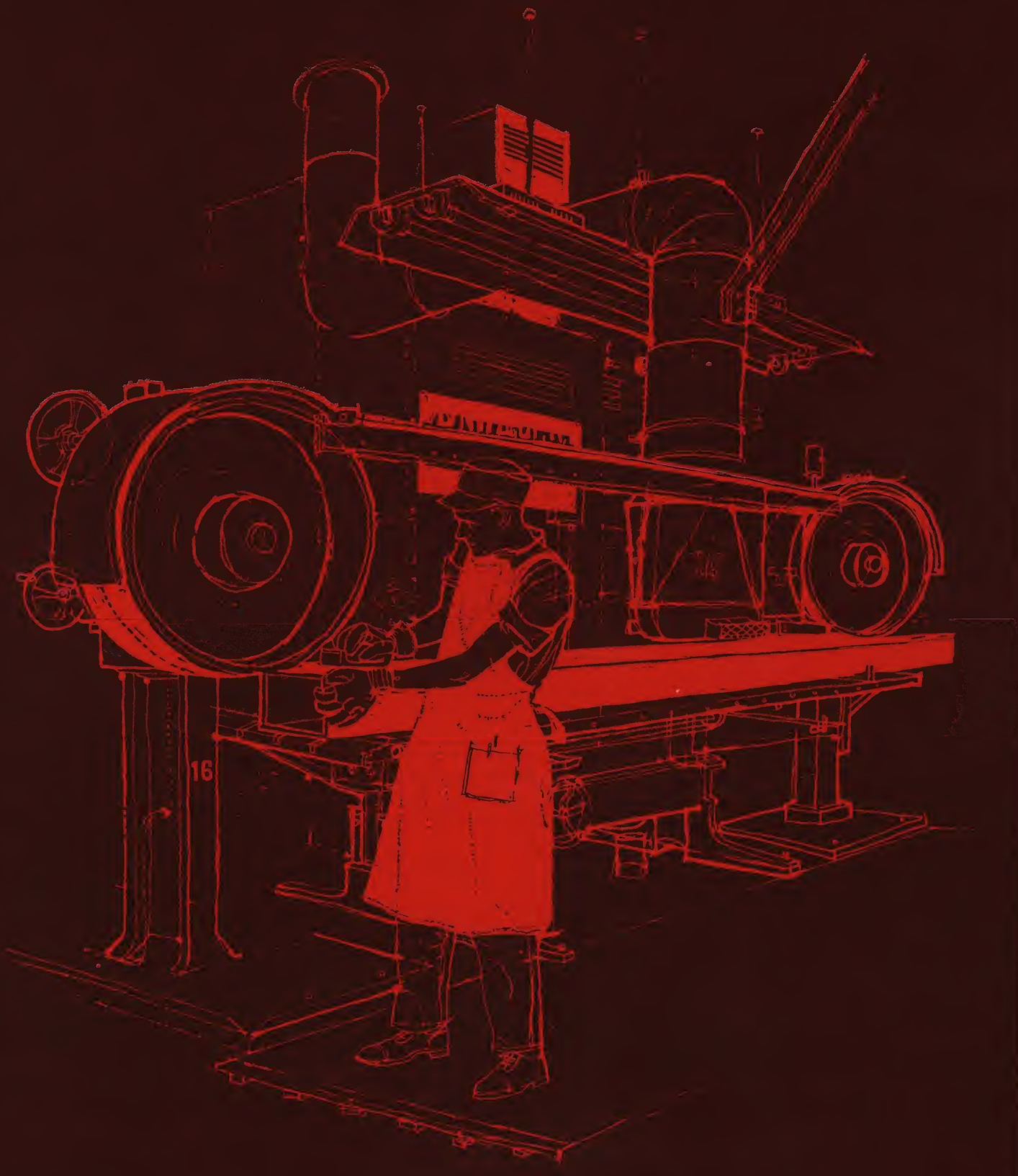
The selection of a proper finish should be carefully decided, for upon it depends the amount and type of maintenance necessary through the years after the job is completed.

MECHANICAL FINISH DESIGNATIONS

Olin	NAAMM	Appearance	How Obtained
NF	NA-0	Natural	As fabricated.
M1	NA-1	Lustrous (requires maintenance to retain appearance)	Polished with aluminum oxide compound. Grits to be coarser than 320; final polishing with a 320 grit, using peripheral wheel speed 6000 feet per minute.
M2	NA-2	High Polish (finest surface appearance available)	Polished with aluminum oxide compound. Grits to be coarser than 320; final polishing with a 320 grit, using peripheral wheel speed of 6000 feet per minute. Polishing followed by buffing, using aluminum oxide buffing compound and peripheral wheel speed of 7000 feet per minute.
M3	NA-3	Coarse Satin Finish (uniform appearance)	Coarse satin finish producing a surface with parallel scratch lines. Grit used to be a 120 to 140 aluminum oxide type, peripheral wheel speed of 6000 feet per minute.
M4	NA-4	Medium Satin Finish	Medium satin finish producing a surface with parallel scratch lines. Grit used to be a 140 to 180 aluminum oxide type; peripheral wheel speed of 6000 feet per minute.
M5	NA-5	Fine Satin Finish (popular architecturally)	Fine satin finish producing a surface with parallel scratch lines. Grit used to be a 180 to 220 aluminum oxide type; peripheral wheel speed of 6000 feet per minute.
M6	NA-6	Hand Rubbed (not for large areas)	Hand-rubbed finish, using stainless steel wool lubricated with neutral soap solution. Final rubbing with #0 steel wool.
M7	NA-7	Matte Finish	Wire wheel brush finish, using stainless steel wire brush. Wire diameter .0095″; peripheral wheel speed 6000 feet per minute.
M8	NA-8	Common Soft Texture (for uneven surfaces)	Vonnegut wheel finish, using #220 aluminum oxide type abrasive, flat type wheel for flat surfaces, shredded type for uneven surfaces.
M9	NA-9	Matte Finish (presents gray appearance when anodized)	Coarse sand blast finish, using 16 to 20 mesh silica sand if darkening is not a problem; otherwise aluminum oxide type abrasive. Air pressure 30 to 90 pounds (depending on gauge of material); gun distance one foot from work at an angle of 60 to 90 degrees.
M10	NA-10	Rough Texture (not recommended for aluminum under ⅛″ thick)	Medium sand blast finish, using 40 to 50 mesh silica sand if darkening is not a problem; otherwise aluminum oxide type abrasive. Air pressure 30 to 90 pounds (depending upon gauge of material); gun distance one foot from work at an angle of 60 to 90 degrees.
M11	NA-11	Fine Texture (uneconomical on very thin sheet)	Fine sand blast finish, using 100 to 200 mesh silica sand if darkening is not a problem; otherwise aluminum oxide type abrasive. Air pressure 30 to 90 pounds (depending upon gauge of material); gun distance one foot from work at an angle of 60 to 90 degrees.
M12	NA-12	Textured	Shot blast finish, varying in texture with the size of shot and amount of air pressure used.
M13	NA-13	Very High Polish (Mirror-like finish)	Buffed and chemically brightened finish.
M14	NA-14	Uniform Matte Finish	A uniform, matte surface created by loose sand, gravel, steel balls used in an agitating process. Suited for castings and flat sheet.

NOTE: The Olin & NAAMM (National Association of Architectural Metal Manufacturers) designations are temporary pending recommended designations by the Aluminum Association.

GRINDING, BUFFING, AND POLISHING are done with various types of equipment by the end product fabricator. Although many types of finishing machinery are available to produce specific end products, the belt sanding device is common in architectural fabrication because of its flexible shop application.



THE ♀ QUALITY CONCEPT: CHEMICAL FINISHING

ELECTROCHEMICAL – The natural beauty of mill finish is protected by a strongly affinitive and instantly self-renewing transparent oxide coating. Resistance of the surface to chemical attack or abrasion is dependent on the depth of this coating, which can be greatly increased beyond the natural thickness by anodizing, an electrochemical process. This materially enhances the metal's surface beauty and increases its resistance to corrosion and abrasive damage. The anodized film makes a dense, chemically inert but transparent coating for etched or other mechanical finishes and does not disturb surface textures. This process imparts a hard surface and increases the resistance to scratching, discoloration, and pitting.

The final appearance of an anodized finish depends upon the particular type of coating specified, the alloy used and the surface pretreatment rendered. Appearance matches between different components must be predetermined by the exact selection of comparable alloys in the various types of mill products used.

CHEMICAL AND ELECTROCHEMICAL FINISH DESIGNATIONS

Olin	NAAMM	Appearance	How Obtained
C1	NA-CE	Fine Texture (without directional grain or lines)	Caustic etch, using solution of sodium hydroxide or sodium hydroxide and sodium chloride. Degree of etch to be controlled by time and strength of solution.
CC1	No Symbol	(color selection ranges from natural to straw, gray and green)	Chemical conversion coatings such as Alodine, Bonderite or Lyfinite; used for decoration and as a pre-paint treatment.
CB	NA-CB	Very High Polish (Mirror-like finish)	Chemically brightened finish, highly lustrous and bright.
A1	NA-1A	Clear (most popular architectural anodic coating)	Clear anodized finish having a minimum coating thickness of .0004" and minimum coating weight of 17 mg. per square inch.
A2	NA-2A	Clear (provides maximum reasonable protection for exterior applications)	Clear anodized finish having a minimum coating thickness of .0008" and minimum coating weight of 35 mg. per square inch.
AP1	No Symbol	(as specified)	Paints, lacquers and enamel applied to properly prepared aluminum surfaces.
AP2	No Symbol	(as specified)	Porcelain enamel.
S	No Symbol	(as specified)	Any finish not listed; must be specified.

COMBINED FINISHES

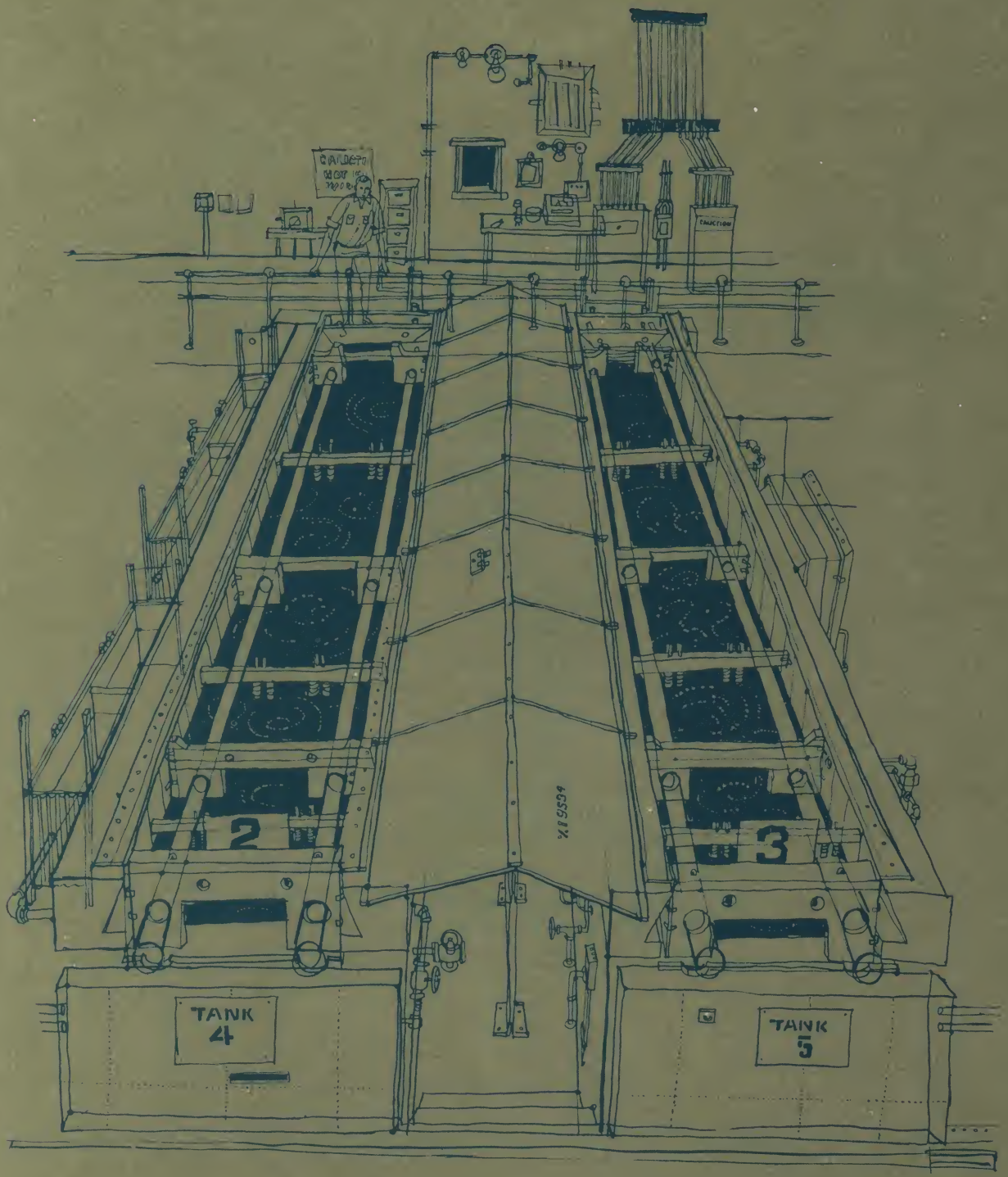
To designate combination finishes, simply combine the symbols identifying the various component finishes. As an example, a fine textured surface obtained by caustic etch combined with a clear anodized finish (.0008" thick) would be written as C1A2.

RECOMMENDED COATING GUIDE FOR ANODIZING

	Sheet, Tubing and Extruded Shapes (Minimum Coating)						Castings (Minimum Coating)					
Exterior Applications	Cleaned Often		Cleaned Occasionally		Cleaned Seldom		Cleaned Often		Cleaned Occasionally		Cleaned Seldom	
	Thickness	Wt.	Thickness	Wt.	Thickness	Wt.	Thickness	Wt.	Thickness	Wt.	Thickness	Wt.
Suburban	0.0006"	28	0.0006"	28	0.0008"	35	0.0006"	28	0.0006"	28	0.0008"	35
Urban	0.0006"	28	0.0008"	35	0.0010"	44	0.0006"	28	0.0006"	28	0.0008"	35
Industrial	0.0008"	35	0.0010"	44	0.0010"	44	0.0008"	35	0.0008"	35	0.0010"	44
Interior Applications	Thickness		Weight				Thickness		Weight			
Light Duty	0.00025"		12				0.00025"		12			
Medium Duty	0.00040"		17				0.00040"		17			
Heavy Duty	0.00080"		35				0.00060"		28			

For all color anodized exterior work, minimum coating thickness should be 0.0010 inches.
All coating weights expressed in milligrams per square inch.

ANODIZING is probably the most commonly used protective finish for aluminum. Colorless aluminum oxide coating has long been recognized as a permanent hard surface which will protect mechanical finishes applied to the metallic surface. Recent developments in dyeing have expanded both the range of color and the durability of the process for color application, and account for its great popularity in new architectural applications.



THE ♀ QUALITY CONCEPT: APPLIED FINISHES

PORCELAIN ENAMEL—Porcelain enamel is one of the most durable finishes offered for application to aluminum. The porcelain coatings are inorganic glass frits, fused to the aluminum at temperatures above 800° F. At these temperatures, aluminum permanently combines with the porcelainized surface material to provide a product with the additional properties of glass. The enamel application is usually applied after fabrication, thus permitting an almost limitless number of shapes suitable for curtain wall construction and other architectural applications.

Porcelain enameled aluminum can be drilled, sawed, sheared and punched, according to specifications, without the danger of unsightly corrosion and fractures forming at the raw edges. Should slight damage occur, there is no progressive spalling and no consequent rusting to stain or otherwise mar the remaining exposed areas.

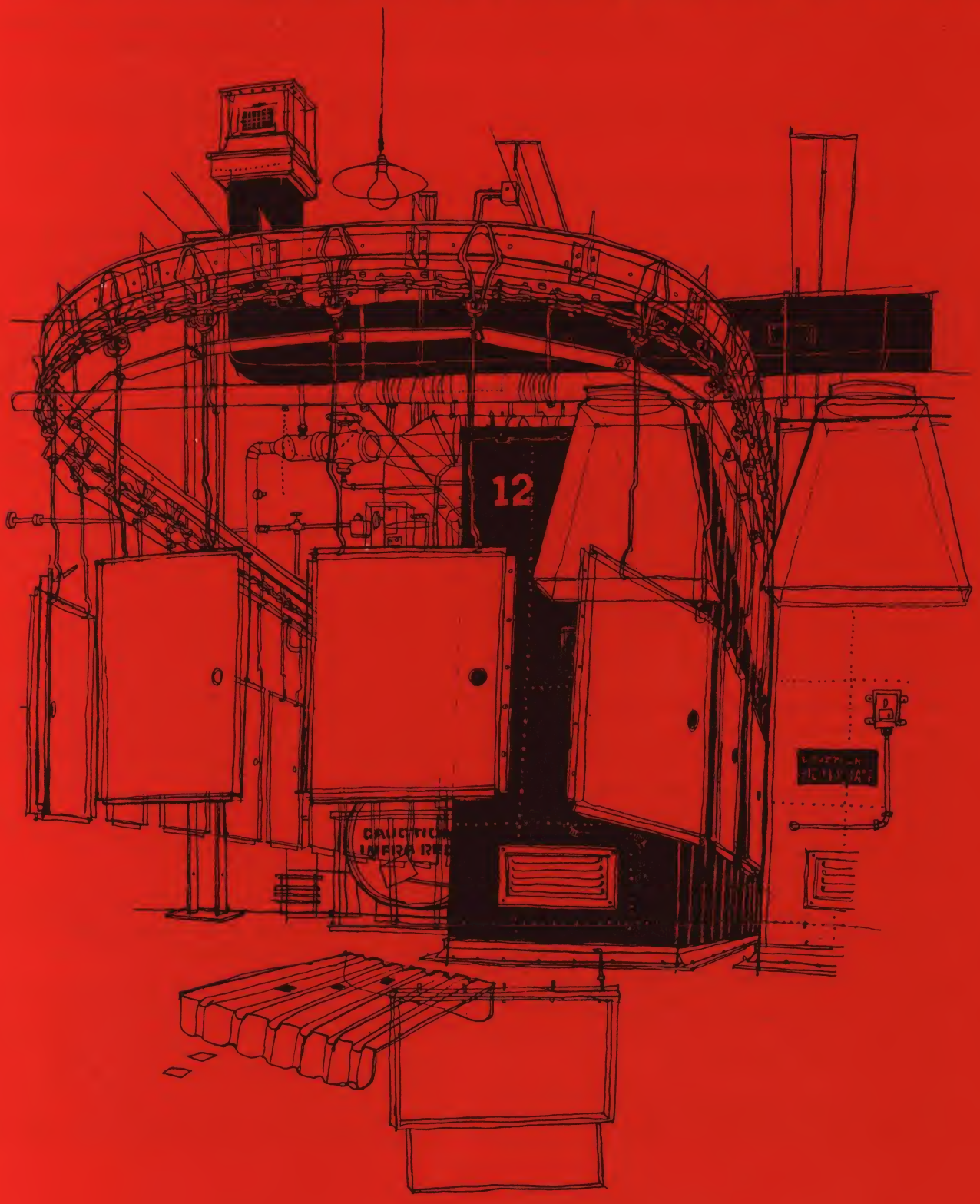
Aluminum's light weight features make porcelainized building products highly desirable. Flat sheets, extrusions, formed shapes, welded assemblies and castings can be porcelain enameled. A broad range of colors is available. These are extremely durable—won't peel or fade, and maintain overall appearance for years.

Porcelain enameled aluminum offers important advantages over enameled steel in fabrication, shipping and handling costs. Because porcelain enamel adheres more effectively to aluminum than to steel, the material provides greater chip resistance and looks nicer, longer. Aluminum's workability on the job and ease of fabrication in the shop, the fact that sheet edges don't rust, plus a weight reduction of as much as two-thirds, are other exclusive benefits aluminum enjoys over steel materials. Refer to Porcelain Enamel Institute, 1145 Nineteenth St., Washington, D. C. Specification Sheet PEI:ALS-105(57) for further information.

BAKED ENAMEL—The field of baked enamels is very broad. For every application of these finishes, there are a number of possible enamels, each with distinct advantages. The types most commonly used are the Alkyds, Epoxies and Acrylics. Generally speaking, the baked enamels are very durable finishes and some approach the qualities of porcelain enamels. They are baked at somewhat lower temperatures, between 300°-500° F., and do not require the high degree of heat control as does porcelain. Baked enamels usually may be fabricated after painting, which imparts economies in manufacturing from sheet and coil stock. The pre-finished material may then be fabricated into siding, roofing or other building panels. Baked enamel on aluminum retains all the inherent advantages of aluminum while adding color and fabrication economies.

PRIMERS—Most painted surfaces require primers or undercoating treatments. In the field of painted aluminum, there are several recommended primers of outstanding quality. Alodine or conversion coating is probably the most widely used. It acts as a coating material to neutralize any reaction between aluminum and the painted surface; while, at the same time, it affords an additional degree of protection against corrosion. Alodine finishes have been used successfully on aluminum without additional paint applications. The high degree of corrosion protection offered by Alodine has made it a particularly adaptable process for industrial application of aluminum, thereby retaining all the weight and fabrication advantages.

FIRING of enamels will vary with the process and materials applied. Though equipment layouts differ from one plant to another, typical firing ovens are equipped with banks of controlling devices and conveyor systems for material handling. Products like coiled stock are continuously painted. This rendering of a paint line illustrates individual products being conveyed to the oven, which is used by some architectural enamelers.



FOREWORD: The following specifications are designed to assist the specification writer.

In order to secure more accurate bids, a higher class of workmanship, and establish direct responsibility, it is recommended that all aluminum work be specified under one or more special sections of the General Specifications, rather than group such work with other metals under a "Miscellaneous Metals" section.

When responsibility for borderline items is encountered, it is recommended that notes be placed on the drawings, such as: "By O.M.C." (Ornamental Metals Contractor), "By M.S.C." (Metal Specialties Contractor), "By C.W.C." (Curtain Wall Contractor), etc.

Where special applications demand the specification of specific alloys, gauges, finishes, colors, etc. not covered in sufficient detail by the following specifications, please consult your Olin Service Representative who will welcome the opportunity to serve you.

SUGGESTED OUTLINE SPECIFICATIONS

1. General Conditions:

a. The General Conditions of the Contract for the Construction of Buildings, Standard Form of American Institute of Architects, latest edition and the supplementary General Conditions are hereby made a part of this specification to the same extent as if bound herein.

2. Scope of Work:

a. Contract for this portion of the work shall furnish labor, materials and equipment required to complete all aluminum and related work indicated on drawings or specified herein.

b. Work shall include all parts and accessories for variations in construction and fabrication required to complete installation of architectural aluminum work shown on the construction drawings.

c. Sealing, calking, and mastic shall be furnished when required in conjunction with work of this section.

d. Provide necessary Anchors, Fasteners, and inserts when required to complete the installation of all work of this section.

e. Submit Shop Drawings to the Architect for approval before fabrication of work shall begin. All materials shall be appropriately designated and the relationship of work under this section with adjoining work by others shall be clearly shown. Where samples are required, they shall be submitted with the Shop Drawings.

f. Provide protective coatings when required for aluminum work included in this section.

g. Storage of materials shall be provided by the General Contractor in an area free from traffic of other trades and protected from the weather.

(When Curtain Wall is included to the extent that it is desirable to have the Curtain Wall Contractor responsible for the entire wall, it is suggested that a separate section titled "Metal Curtain Wall" be used. This section should include additional items, under scope of work, such as; exterior aluminum doors, entrances, store front work and glass & glazing materials. For more detailed information, write NAAMM, 228 North LaSalle St., Chicago 1, Ill., for "Curtain Wall Manual."

3. Materials:

a. The aluminum material shall be structurally sound, of uniform quality, free from harmful defects, and fully equal to those produced by the Metals Division of Olin Mathieson Chemical Corporation, New York, N. Y. Olin alloys shall be as noted for each product and shall have properties according to the Aluminum Association Specifications.

b. Detached hardware which is exposed shall be aluminum, non-magnetic stainless steel, or other non-corrosive materials which are compatible with aluminum and of sufficient strength to perform the function for which they are intended.

c. Systems or accessories of other qualified manufacturers shall be considered only by written approval of the architect one week prior to the bidding due date.

4. Dissimilar Materials:

a. Aluminum to Dissimilar Metals

Where aluminum surfaces are placed in contact with any dissimilar metals, keep aluminum surface from direct contact with such parts by (1) painting dissimilar metal with zinc-chromate primer or other suitable primer, followed by one or two coats of aluminum metal-and-masonry paint or other suitable protective coating, excluding those containing lead pigmentation, (2) painting dissimilar metal with heavy-bodied bituminous paint, (3) good quality calking placed between aluminum and dissimilar metal, or (4) non-absorptive tape or gasket. Steel anchors and connencting members shall be hot-dip galvanized or zinc-chromate primed after fabrication where economy is essential.

b. Drainage from Dissimilar Metals

Paint dissimilar metals if used in locations where drainage from them passes over aluminum.

c. Aluminum to Masonry

Paint aluminum surfaces in contact with lime mortar, concrete, plaster or other masonry materials with alkaline-resistant coatings, such as heavy-bodied bituminous paint or water-white methacrylate lacquer.

d. 1. Aluminum to Wood

Aluminum in contact with wood or other absorptive materials which may become repeatedly wet and/or when the wood is treated with any form of toxic preservative, the aluminum shall be painted with two coats of aluminum metal-and-masonry paint or coat of heavy-bodied bituminous paint. Alternate: paint wood or other absorptive material with two coats of aluminum house paint and seal joints with a good quality calking compound.

5. Finish:

a. Mechanical finishes, such as polishing, grinding, sanding, etc., shall be done in accordance with the specifications set forth by Olin Aluminum. Samples of specified finishes shall be submitted to the architect for approval.

b. Chemical or Electrochemical finishing shall follow the mechanical finishing and be of specified time and intensity according to exposure.

c. Baked enamel finishes shall be given a chemical conversion treatment prior to the application of enamel. Alcyd, Epoxy, Lucite, or Acrylic finishes shall be baked on after application. Baked enamels may be fired at temperatures lower than 800° F.

d. Porcelain enamel finishes shall be inorganic coatings bonded to metal by fusion at temperatures above 800° F.

6. Fabrication & Workmanship:

a. Before starting work, verify governing dimensions at project site. Examine adjoining work on which the work is in any way dependent for its required installation.

b. All work executed under this section shall be fabricated in a shop where the quality of work is recognized by the industry as meeting the highest standards for work of this type. All mechanics involved shall be skilled in the fabrication of aluminum. Work shall be free from blemishes or defects of any type which would affect its strength, durability, or appearance.

c. Expansion & Contraction

All aluminum work shall be so designed, fabricated and anchored as to permit adequate movement of all parts without causing undue distortion or stresses to build up either in the metal or the anchors (the coefficient of thermal expansion for architectural aluminum alloys is 0.000013 per degree Fahrenheit per unit of length).

d. Protection

After fabrication and prior to shipment, all aluminum surfaces not previously protected shall be given two heavy coats of clear methacrylate lacquer.

e. Finish

1. In so far as practical, all work shall be finished following fabrication. Design of units shall be such that no acids are trapped in recesses and standard rinsing processes will cleanse all surfaces. Aluminum work such as flashings, clips, shims and other applications not exposed to view may be provided with an "as fabricated" finish.

2. Prior to anodizing, all exposed surfaces on work to be anodized shall be finished as follows: (Specify here the type, or types, of surface treatment desired, such as; satin finish, chemical etch, polished, sand blasted, etc.)

3. All exposed aluminum work for interior applications (except for those applications where a special tone or color requires additional anodizing time) shall be anodized for a period of not less than thirty (30) minutes utilizing an electrolytic process with a sulfuric acid electrolyte. The anodic coating so produced shall be not less than 0.0004″ thick, with a minimum coating weight of 17 milligrams per square inch. Recommended procedures for cleaning, degreasing, rinsing, sealing, temperature control, acid concentration, voltage and amperage regulation, etc. shall be followed without deviation during the entire process.

4. All exposed aluminum work for exterior applications shall be anodized for a period of not less than sixty (60) minutes utilizing an electrolytic process with a sulfuric acid electrolyte. The anodic coating so produced shall be not less than 0.0008″ thick, with a minimum coating weight of 35 milligrams per square inch. Recommended procedures, etc. as specified under 3. above shall be followed.

7. Temporary Protection:

a. Aluminum surfaces requiring protection against lime mortar stains, discoloration, surface abrasions and other construction abuses shall be protected by a strippable lacquer or tape coating.

b. Strippable coatings should not be exposed to the sun for extreme periods of time as the thin coating will adhere too tightly to the metal. If such is the case, only wooden or plastic pedals should be used to remove it.

8. Tests:

a. Wear, air infiltration and other tests which may be required shall be performed by a recognized testing laboratory and approved by the architect.

9. Erection:

a. Storage and handling prior to Erection. Aluminum sheets shall be stored on end in a dry place. Do not allow aluminum to come in contact with materials that might cause staining of aluminum, such as water, mud, uncured concrete, cement, lime or other strong chemicals in the presence of moisture. No handling or application method shall be used that will scratch, dent, or mar the aluminum surfaces.

b. No erection shall be started until a field check is made of all work by others which may affect in any way the proper installation of work under this section. Should any defects be found, this Contractor shall notify the General Contractor of such defects in writing and the General Contractor shall be responsible for having the defects corrected by the responsible sub-contractor(s). The starting of erection shall serve as a notice to the General Contractor that a field inspection has been made and that the related work by others is acceptable to this Contractor as being suitable for a proper installation.

c. All work shall be erected under the direct supervision of a qualified representative of the fabricator and in strict accordance with approved drawings.

d. All work shall be erected plumb, square, to proper grade, and in proper alignment with the work of others.

e. Adjustment of the work shall be performed by the manufacturer after completion of the entire job.

10. Final Cleaning:

a. Upon completion, contractor shall clean all aluminum work, removing protective coatings*, cleaning off stains, and restoring damaged surfaces when necessary.

*The lacquer coating may be left on as it will "weather" slowly, eventally vanishing from the surface.

b. Steam cleaning is preferred but any detergent or solvent cleaner may be used. Strong alkaline cleaners should be avoided.

c. A coating of liquid wax or clear methacrylate lacquer should be applied after restoration to preserve the surface and make future maintenance easier.

Note: refer to "Care of Aluminum" published by The Aluminum Association, 420 Lexington Ave., New York 17, N. Y., July 1959.

11. Guarantee:

a. The contractor shall furnish to the owner a written guarantee against any and all defects in workmanship, materials and finish which may appear within a period to one (1) year following acceptance of the work by the architect.

OLIN ALUMINUM

OLIN MATHIESON • METALS DIVISION • 400 PARK AVENUE, NEW YORK 22, NEW YORK

These Olin Aluminum sales offices are staffed for service to you, and ready to help you with your architectural problems.

AKRON 1
11 South Forge Street
JEfferson 5-[illegible]

ATLANTA 9
1500 West Peachtree Street N.W.
TRinity 5-[illegible]

BALTIMORE
19 West Pennsylvania Avenue
P. O. Box [illegible], Towson, Maryland
VAlley 3-[illegible]

BIRMINGHAM 5
2[illegible] Ninth Avenue So.
FAirfax [illegible]

BOSTON
4[illegible] Watertown Street
P. O. Box 96, Newton 95, Mass.
DEcatur 2-[illegible]

CHARLOTTE 6
2201 No. Davidson Street
P. O. Box [illegible]
FRanklin 5-[illegible]

CHATTANOOGA
[illegible]
P. O. Box [illegible]
AMherst [illegible]

CHICAGO 16
[illegible] N. [illegible] Avenue
[illegible] 7-[illegible], [illegible]

CINCINNATI 6
1216 E. McMillan Street
DAvenport 1-[illegible]

CLEVELAND 13
55 Public Square, Room [illegible]
PRospect 1-4444

DALLAS 35
100 Exchange Park North
FLeetwood [illegible]

DAVENPORT
111 East 3rd Street
Tel. No. 3-6251

DAYTON 2
349 W. First Street
BAldwin 6-[illegible]

DENVER 20
[illegible] E. Colfax
FLorida 5-0471

DETROIT
3101 N. Woodward Avenue
Royal Oak, Mich.
Liberty 9-5500

GRAND RAPIDS 2
5 Lyon Street N.W.
GLendale 8-1256

HOUSTON 24
2728 Long Point Rd.
OVerland 2-[illegible]

INDIANAPOLIS 4
150 W. Market St.
MElrose 5-7813

KANSAS CITY 12
612 W. 47th Street
PLaza 3-2055

LOS ANGELES 5
3248 Wilshire Blvd.
DUnkirk 5-3201

LOUISVILLE 7
3701 Westport Road
TWinbrook [illegible]

MIAMI 38
1101 N.W. 79th St.
P. O. Drawer R, Little River Station
PLaza 7-0850

MILWAUKEE 3
229 N. Milwaukee Ave.
BRoadway [illegible]

MINNEAPOLIS 2
827 Marquette Ave.
FEderal [illegible]

NEW HAVEN 4, CONN.
275 Winchester Ave.
SPruce 7-1981

NEW YORK 22
625 Madison Ave.
PLaza 1-4540

OMAHA 3
4018 Farnam Street
CApitol 2250

PHILADELPHIA
1 Bala Ave., Bala Cynwyd, Pa.
MOhawk 4-6100

PITTSBURGH 19
129 Fourth Ave.
GRant 1-3855

SAN FRANCISCO 4
353 Montgomery St.
YUkon 2-9434

SEATTLE 1
1807 Seventh Avenue
MAin 4-[illegible]

SOUTH BEND 1
108 N. Main St.
CEntral 4-8787

ST. LOUIS 5
111 South Bemiston Ave.
PArkview 5-0247

SYRACUSE 9
[illegible] James St.
GRanite 2-7851

TULSA 5
1407 S. Peoria Avenue
Riverside 3-2660

WICHITA 2
150 N. Main Street
AMherst 3-8792

EXECUTIVE OFFICES
400 Park Avenue
New York 22, N. Y.
PLaza 1-7827